JULY 2, 1984
CHEMICAL & ENGINEERING

NEWS

SALARY SURVEY

Chemists' salaries edge upward as unemployment dips **Page 27**

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Salary Survey

Unemployment is down; salaries are higher, but raises are modest compared to previous years. **Page 27**

Biotechnology Stocks Still Floundering

Some securities analysts, weighing a variety of technical factors and a growing feeling that institutional investors, heavy with cash at the moment, are about ready to start buying stocks again, now are predicting a summer stock rally. Would a general surge sweep along the shares of biotechnology-based companies? Most of them would like to think so.

Biotechnology stocks have taken a severe beating since reaching their last peak early in the year. Between Jan. 6 and June 15, Standard & Poor's 400 Industrials stock index declined 11%. During the same period, C&EN's biotechnology stock index plunged 24%, more than twice the drop of the market in general. C&EN's biotechnology stock index—based on a fairly arbitrary selection of companies—tracks share prices of Amgen, Applied Biosystems, Biogen, Centocor, Cetus, Damon Biotech, Genentech, Genetic Systems, Genex, Hybritech, Molecular Genetics, and Monoclonal Antibodies.

The decline of the C&EN biotechnology stock index also was worse than that for the Over-the-Counter Composite Index—18% between Jan. 6 and June 15 of this year. Other major measures of stock market performance also indicated large declines, but most were of much smaller dimensions than that of the biotechnology stocks. For instance, the Dow Jones Industrials Average went down 16% during the period; the Dow Jones 65 Stocks Average declined 18%; the New York Stock Exchange Composite dropped 12%; the New York Stock Exchange Industrials dropped 11%; and the American Stock Exchange Index dropped 13%.

The biotechnology stock decline was general. Of the dozen companies, only the shares of Applied Biosystems, a supplier of lab equipment to biotechnology-based companies, rose in price—up 5.3% since the beginning of the year.

Of the 11 losers, least battered were the two biggest companies; the price of shares of Genentech, which made several major scientific breakthroughs but failed to get a product on the market in the first half of the year, dropped 11%, and the price of shares of Cetus, which last month formed a $60 million partnership with W. R. Grace & Co. (C&EN, June 18, page 8), declined 14%.

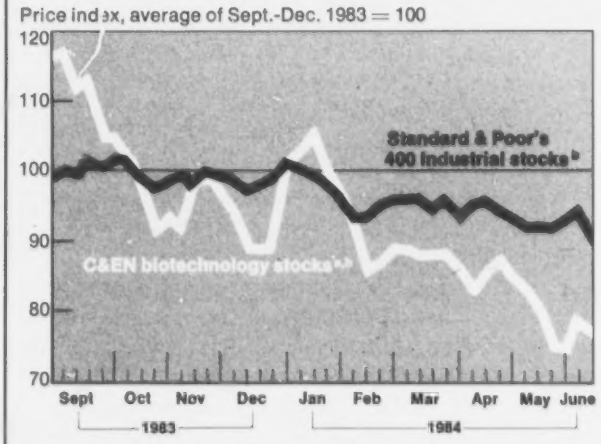
Stock prices of the other firms decreased far more sharply. Monoclonal Antibodies, rapidly increasing revenues from its diagnostic kits, still declined 20%; Molecular Genetics, now selling its first product in the U.S., still went down 23%. Biogen stock was down 24%, Damon Biotech 28%, Hybritech 31%, Amgen 33%, and Centocor 37%.

The two worst performers were Genex, the price of whose stock was down 44%, and Genetic Systems, whose stock was down 45% since Jan. 6.

As a result, most biotechnology stocks are trading at prices near the low end of their 52-week range. Applied Biosystems, again, is an exception. Whether some of these stocks are now poised to begin rising again remains to be seen.

David Webber, New York

Biotechnology stock prices have fallen further than rest of the market . . .



a Based on stock prices for Amgen, Applied Biosystems, Biogen, Centocor, Cetus, Damon Biotech, Genentech, Genetic Systems, Genex, Hybritech, Molecular Genetics, and Monoclonal Antibodies. b Reindexed to average for Sept.-Dec. 1983 period to show relative change.

. . . and many stocks remain near bottom of last 12 months' range

Company	Recent price[a]	52-week range High	52-week range Low
Amgen	$ 5 3/8	$18	$ 4 5/8
Applied Biosystems	20	22 1/2	2 1/4
Biogen	8 1/2	17 3/4	8
Bio-Response	8 3/4	16 1/8	8
Bio-Technology General[b]	6 1/2	10	5
California Biotech	7	14	7
Centocor	9 1/2	19 1/4	8 3/4
Cetus	11 1/4	17 7/8	10
Collaborative Research	5 1/4	15 1/2	4 1/4
Damon Biotech	6 5/8	17 1/2	6
Enzo Biochem[b]	15 1/4	34 1/4	12 1/4
Genentech	34	49 3/4	25 7/8
Genetic Systems	5 3/4	17 3/4	5 5/8
Genex	9	23 1/4	8 1/4
Hybritech	14 3/4	30 3/4	12 1/4
Molecular Genetics	10 1/4	22 1/2	8 3/4
Monoclonal Antibodies	11 1/2	21 1/2	10

a As of Friday, June 15, close. b Adjusted for split.

Conference mulls Europe's specialties prospects

Whether Western Europe's chemical climate is conducive to building profits by entering the specialties business was scrutinized late last month by nearly 200 delegates attending a specialties conference in Monte Carlo.

It was a session forcing them to ponder that for Europe specialties account for only about 18% of total chemical industry sales, whereas in the U.S. they are just shy of a quarter of chemical sales. It also was a session that took on the color of a primer course in specialties acquisition with 10 speakers from acquisition- or business-strategy consultant firms and one securities analyst concerned with acquisition impact on share prices.

And it was a session carrying warnings from at least one consultant, Charles H. Kline, president of Charles H. Kline & Co., of Fairfield, N.J., that the current emphasis in the U.S. is on specialty materials—for example, fiber composites—rather than specialties per se. The time for chemical specialties, he suggested, already may have passed.

Nonetheless, interest in specialties continues high, as Adolf Lanzdorf, a principal with consultants Booz Allen & Hamilton in Düsseldorf, West Germany, and Nigel Andrews, a vice president at that company's New York City headquarters, pointed out in a joint presentation. Companies recognize that international specialty market positions are important, they said, in such fields as pharmaceuticals, adhesives, and biotechnology. Moreover, commodity companies recognize that on the whole, specialties are faster growing and more profitable than commodity lines, so are entering such fields both to capture such advantages and to make themselves more attractive as stock market investments.

Acquisitions are a good way to enter the chemical specialties business, Kline says, but such acquisitions are becoming increasingly expensive, so companies opting to get into the business this way must be increasingly selective.

In addition, companies also handicap themselves with unrealistic acquisition criteria, according to Lanzdorf and Andrews. For high returns, competitive position in a market, rather than the attractiveness of the market segment itself, is important, and profitability within segments can vary up to 7% from the average. A large part of the market is already controlled by a few major companies, both in Europe and the U.S., with few independent companies of significance existing. Therefore, acquisition criteria that specify 10% annual growth, a leading position in the market, an attractive market, and so on, lead to only 3% of acquisition targets being acceptable.

Specialties are only 18% of chemical sales in Europe

$ Billions	Europe	U.S.	Other	Total
Specialties	$ 27	$ 34	$ 19	$ 80
Fine chemicals	22	20	13	55
Pseudo-commodities	65	53	50	168
Commodities	40	36	38	114
TOTAL	$154	$143	$120	$417

Source: Charles H. Kline & Co.

Andrews suggests that companies contemplating entering the specialties field seek opportunities in what he terms discontinuities in the business, in applications expertise and substitution economics. These could involve opportunities arising from patent expiration (for example, photoresists), technical substitution (such as biotechnology), customer preference changes (for instance, water treatment), system economics (advanced materials and agricultural chemical intermediates), and new applications for existing technology (such as fluorination in agrochemicals).

Whatever field a company enters, however, there are several possible routes for buying into the business. Frode Nordhoy, president of Consultant Strategic Analysis of Reading, Pa., outlined the ways to enter. A company could acquire the leading supplier in a business, Nordhoy points out, which would give a solid market position, but at a premium price. It could acquire a minor supplier, to give a "window" into the market, but it would then be difficult to expand significantly. A company could acquire several smaller suppliers, to avoid the high premium, but it would find it difficult and slower absorbing the several purchases than just one large one. Or it could purchase technology, or enter a joint venture, he adds.

On the other hand, a company can always elect to develop specialties in-house. However, this can be difficult, because most corporate management in the chemical industry has grown up thinking "bulk" commodities and markets. And even a small, halfway step toward bridging the gap between commodities and specialties can be fraught with problems.

That was the report of J. A. Bigot, director of planning and development for the chemical products division at DSM, the Netherlands state-owned oil and petrochemicals producer. His testimony was vivid evidence that "specialties" is relative; DSM includes as such many products that others consider too large-volume to be true specialties. But it can be a first step toward higher-value specialties for a large oil producer geared to bulk chemicals.

According to Bigot, when his fine chemicals group first started and its activities were a negligible element in the overall business of the company, its planning—highly flexible and action oriented—was basically ignored or treated condescendingly by the rest of the company. However, as the group grew and gradually began asking for more resources, pressure was put on the group to take part in the planning system developed for the bulk operations—with much data gathering and long-term, inflexible predictions. "It took permanent and strong opposition" to avoid being put under those constraints, Bigot reported, as his group fought to justify its existence. And later, in the question-and-answer session, he added that the group although profitable and growing, still must fight to justify its existence; there are still bumps in the road. □

Although Unemployment Dips This Year, Salary Gains Are Slim

Median salaries are 5% higher than last year for Ph.D. chemists but up only 3% for non-Ph.D.s, survey of ACS members indicates

Like the financial health of the U.S. chemical industry, the economic status of U.S. chemists has improved this year from what it was in 1983. Unemployment is lower. Salaries are up.

But so far as the job situation goes, this year's figures look more favorable when compared with the previous year's than with those from earlier years. The latest annual survey of the economic status of American Chemical Society members indicates that 1.7% of the chemists were jobless and looking for employment, as of last March. Although down from the 10-year peak of 2.2% a year earlier—and far below the overall U.S. unemployment rate of 7.7% of the labor force that month—that unemployment rate for chemists is higher than in any previous year since 1976. And it is appreciably higher than the approximately 1% level of joblessness that prevailed from 1979 to 1981.

Moreover, 93.7% of ACS chemists (excluding those who are unemployed but not seeking work) were working full time this past March. Although that's a slightly higher percentage than the year before, it is lower than in any earlier year since 1972, when unemployment climbed to 3.2%. Much of the decline in unemployment, in fact, can be attributed to an increase in the number of chemists holding down postdoctoral or fellowship positions; nearly 3% of ACS chemists are doing such work, a higher fraction than at any time in the past decade.

This year's survey, conducted by the ACS Office of Statistical Services under the aegis of the Council Committee on Economic Status, also indicates that chemists' salaries rose only modestly during the 12 months ending last March—even less than had been the case during the two previous years. For Ph.D. chemists, the median salary increased 5% to $42,000. (The median is the salary that is exceeded by 50% of all individuals responding to the ACS survey.) Not since 1978 had the year-to-year gain been so slim. And for chemists whose highest degree is either a B.S. or an M.S., annual salaries (excluding earnings from overtime or supplemental employment) at the median were only 3% higher than indicated by the 1983 survey. That's only half the average annual increase during the past 10 years.

Few ACS members, no matter what their background, are looking for work this year . . .

	Chemists									
		By sex		By highest degree			By minority status		Chemical	All
Employment status[a]	Total	Men	Women	B.S.	M.S.	Ph.D.	Minority[b]	Nonminority	engineers	members[c]
Employed full time	92.9%	93.7%	87.7%	94.3%	93.9%	91.9%	87.7%	93.2%	93.4%	92.7%
Employed part time	1.7	1.3	4.2	1.7	2.1	1.5	0.8	1.8	1.6	1.8
Postdoctoral or fellowship	2.9	2.8	3.5	0.5	0.3	4.9	8.3	2.4	0.7	2.5
Unemployed										
Seeking employment	1.7	1.6	2.6	2.2	2 2	1.2	3.2	1.6	3.0	1.9
Not seeking employment	0.9	0.7	1.9	1.3	1.5	0.5	0.0	0.9	1.3	1.0

a As of March 1, 1984. b Black, American Indian, Alaskan native, Asian, Pacific Islander, Filipino, Hispanic, or other. c Includes ACS members whose highest degree and present work are in neither chemistry nor chemical engineering. **Source:** ACS survey

. . . and salaries have risen less than is usual for the past decade

											Annual change		
$ Thousands	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1979–84	1974–84
CHEMISTS' MEDIAN SALARIES[a]														
B.S.	$30.9	$30.0	$28.5	$27.5	$25.0	$23.5	$22.0	$21.0	$19.8	$19.0	$17.5	3%	6%	6%
M.S.	34.0	33.0	31.6	30.0	26.0	25.0	24.0	22.0	20.5	19.8	18.4	3	6	6
Ph.D.	42.0	40.0	37.5	35.0	31.2	29.0	27.4	26.0	24.7	23.0	21.7	5	8	7
All chemists	38.0	36.0	34.7	32.0	28.9	na	na	na	na	na	na	6	7[b]	na

a As of March 1, 1984. b Annual change for the years 1980–84. na = not available. **Source:** ACS survey

Salaries increase with experience, but less markedly 30 years or more after graduation

Years since B.S. degree	Annual salaries of nonacademic chemists ($ thousands)[a]										
	0 to 1	2 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 or more	Overall
B.S.											
90%	$26.0	$30.0	$35.0	$44.8	$51.4	$54.8	$62.3	$63.4	$70.0	$87.6	$52.0
75%	23.8	26.0	30.0	38.0	41.6	47.0	55.0	52.5	50.4	60.0	40.8
50%	20.2	23.0	26.0	32.5	36.5	38.6	42.5	45.0	40.0	47.0	31.0
25%	17.0	20.0	22.9	27.0	30.9	32.5	35.0	36.1	33.6	35.0	24.4
10%	14.4	16.8	20.0	23.0	25.3	27.0	29.4	30.0	27.4	28.0	20.0
M.S.											
90%	—	33.6	36.0	45.0	54.2	60.0	58.2	71.6	71.4	79.0	56.0
75%	—	28.0	32.9	39.1	45.0	50.0	49.5	60.0	57.1	51.7	45.2
50%	—	25.9	28.8	33.4	39.0	43.0	43.0	45.0	48.0	46.0	36.0
25%	—	23.0	25.0	29.0	32.6	34.0	36.2	37.0	40.6	38.6	30.0
10%	—	20.0	21.5	25.9	28.0	27.7	29.0	32.0	30.3	25.4	25.0
Ph.D.											
90%	—	—	42.0	49.8	60.0	71.3	70.0	78.3	80.2	81.6	68.0
75%	—	—	38.7	45.0	52.0	60.0	60.4	65.0	68.0	69.0	56.0
50%	—	—	36.0	40.0	45.0	50.0	52.0	55.0	55.6	59.0	46.0
25%	—	—	33.6	36.3	39.0	43.0	45.0	45.0	47.4	49.5	39.0
10%	—	—	31.0	33.6	34.4	37.3	39.0	38.5	38.2	40.4	34.0

a As of March 1, 1984. **How to read this table:** Using, as an example, B.S. chemists two to four years after having received their B.S. degree, 90% of these chemists have annual salaries of $30,000 or less, 75% have annual salaries of $26,000 or less, 50% have annual salaries of $23,000 or less, 25% have annual salaries of $20,000 or less, and 10% have annual salaries of $16,800 or less, as of March 1, 1984. **Source:** ACS survey

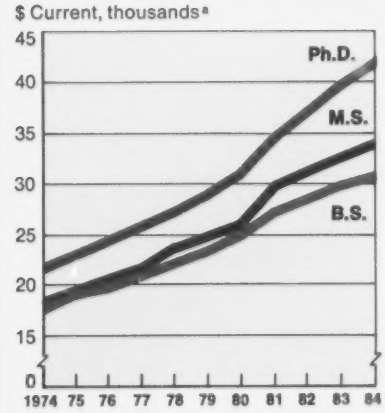
This year's moderate improvement in median salaries, however, at least is roughly in line with price inflation during the past year or so. Consumer prices increased a little less than 5% between March 1983 and March 1984. During the past four or five years, by and large, salaries for chemists were nearly unchanged, after adjustment for inflation. For Ph.D.s, in fact, salaries measured in constant dollars actually have edged up a bit since 1980. This recent record at least compares favorably with the severe slump in the purchasing power of chemists' salaries that took place during the seven years beginning with 1973. Nevertheless, constant-dollar salaries this year still are about 10 to 15% lower than they were a decade ago.

For individual chemists, however, whatever degree they have, the overall median provides scant information regarding the way their salaries stack up against those of colleagues. Typically, chemists working in industry earn more than those employed elsewhere. Those who supervise several people do better than those who supervise few or none. In industry, as would be expected, chemists in managerial jobs earn appreciably more than those who work in research labs or in production assignments; those in marketing positions fall between these groups. For industrial chemists, too, salaries tend to be highest for the 6% who work for petroleum firms.

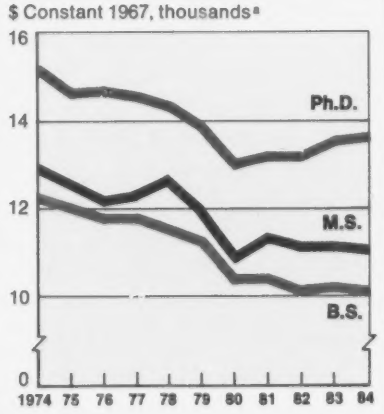
Among academic chemists, those teaching at schools that offer a Ph.D. degree have a strong salary advantage over their colleagues employed by colleges or universities that do not. This is especially true for those who are full professors.

No matter where chemists work, experience is one of the most significant factors affecting their salaries. It is considerably more a factor during the first 20 years or so after earning a degree, however, than in the latter stages of a career. Thus, for nonacademic chemists with a B.S. degree, the median for those who graduated 20 to 24 years ago is nearly double the median for those who have started working only in the past year. But the median for nonacademic B.S. chemists with 40 or more years' experience is only about a fifth higher than for those who are 20 to 24 years out of school.

Chemists' salaries continue to move higher...



... but change little recently when adjusted for inflation



a Median salary of chemists as of March of each year. **Source:** ACS survey

Industrial chemists earn most working for petroleum firms

Industry	% of industrial chemists: All chemists	B.S.	M.S.	Ph.D.	Mean salary ($ thousands)[a]: B.S.	M.S.	Ph.D.
Chemical	34%	29%	31%	39%	$36.9	$39.6	$46.2
Pharmaceutical[b]	18	16	19	18	35.3	37.8	50.9
Petroleum	6	5	5	7	40.6	46.1	55.1
Coatings	5	7	6	3	34.5	40.1	47.3
Food	4	4	4	4	34.7	37.5	47.8
Metals and minerals	3	4	3	2	34.2	37.5	45.5
Rubber	2	3	3	2	34.9	40.4	49.5
Other manufacturing	21	22	22	21	34.7	39.0	48.6
Nonmanufacturing	7	10	8	5	33.0	47.4	48.7

a As of March 1, 1984; to facilitate comparison, salaries are adjusted for differences in the average experience for each group. b Includes personal care products. **Source:** ACS survey

Salaries rise as number of subordinates increases

Number of subordinates	Median annual salaries,[a] chemists in private industry ($ thousands): All chemists	B.S.	M.S.	Ph.D.
ALL SUBORDINATES				
0	$33.5	$27.8	$32.0	$41.0
1–2	40.0	32.7	37.3	44.0
3–7	42.0	35.0	39.1	47.4
8–12	49.6	40.0	45.5	53.5
13–17	51.0	43.8	47.5	55.0
18–22	52.5	45.0	48.4	57.6
23–32	57.8	46.0	50.0	65.0
33–47	64.0	48.0	52.8	69.0
48–67	64.5	56.0	—	66.3
68–99	79.0	—	—	79.2
100 or more	80.0	75.0	65.8	88.5
PROFESSIONALS AND TECHNICIANS ONLY				
0	$33.8	$28.0	$32.0	$41.0
1–2	40.0	33.0	37.0	43.7
3–7	43.0	36.0	40.0	48.0
8–12	50.0	42.0	47.4	54.5
13–17	52.0	49.0	50.0	53.6
18–22	53.5	45.0	44.5	59.0
23–32	65.0	57.5	57.1	65.0
33–47	65.0	52.8	57.0	67.5
48–67	66.3	64.0	62.8	70.0
68–99	80.0	—	—	80.0
100 or more	86.0	—	—	88.0

a As of March 1, 1984. **Source:** ACS survey

Similarly, for Ph.D. chemists working outside of academia, the difference between median salaries of those with about 20 years of work experience and those with four years or less is roughly double the difference between those with 20 years' experience and those who are 36 or more years away from obtaining their Ph.D.

As for academic chemists, median salaries advance sharply as individuals rise through the ranks from assistant to associate to full professor (as most of them apparently do). But the differences in medians with length of experience once full professorship has been attained are much less distinct.

Academic chemists, however, no matter what their rank or experience, earn salaries well under those of their industrial counterparts. Compare, for example, salaries of Ph.D. chemists who received their B.S. degree 25 to 29 years ago. The median for those working at basic research in an industrial lab is 25% higher than those employed as a full professor in a Ph.D.-granting college or university and 60% higher than those ranked as associate professors. For industrial chemists who are managing R&D, the median salary at this level of experience is 36% higher than that for full professors in Ph.D.-granting institutions.

The differences in salary with experience, type of employer, and work function that are indicated in this year's survey of ACS members are similar to those found in previous ACS surveys. As in the past, too, men tend to earn higher salaries than women, wherever they work. In part, this reflects the fact that women, as a group, are younger and less experienced than men in the overall ACS sample. For example, among chemists working in industrial jobs, two thirds of the women finished undergraduate school less than 15 years ago, but only slightly more than a third of the men did so.

But even if the data are adjusted for differences in years of experience for men compared to women, the salary advantage for men persists. The gap between men's and women's salaries, moreover, does not seem to have narrowed appreciably in recent years. For B.S. chemists in industry, in fact, it has widened; this year the mean (rather than median) salary for women was just under 80% that for men. Last year, for women with a B.S. who were employed as industrial chemists, the mean salary was 85% that of similar men; in 1982, it was 88% as high.

On the other hand, among industrial chemists with a Ph.D. degree, the mean salary for women is 92% that of men, up from 86% in 1983 but down from 96% in 1982. For academic Ph.D.s, however, the adjusted mean salary for women is 82% that

Women's salaries are most comparable to men's for Ph.D. chemists

Mean salary, $ thousands[a]	B.S.: All chemists	Men	Women	Women as % of men	M.S.: All chemists	Men	Women	Women as % of men	Ph.D.: All chemists	Men	Women	Women as % of men
EMPLOYER												
Private industry	$36.4	$36.9	$29.2	79%	$40.4	$41.2	$35.1	85%	$50.2	$50.4	$46.1	92%
College/university	—	—	—	—	30.2	31.0	25.6	83	33.7	37.5	30.8	82
Government	31.3	32.0	29.2	91	34.5	35.9	27.8	77	44.2	44.7	41.0	92
Other	29.6	30.1	29.3	97	36.1	37.9	29.9	79	44.8	46.4	34.9	75

a As of March 1, 1984; to facilitate comparison, salaries are adjusted for differences in the average experience for each group. **Source:** ACS survey

In industry, women earn less than men and researchers' salaries lag those of managers

Years since B.S. degree		Median salary ($ thousands)[a] 0–1	2–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40	Overall
CHEMISTS EMPLOYED FULL TIME IN INDUSTRY												
Sex												
Men	B.S.	$21.4	$23.7	$27.8	$33.3	$38.0	$40.0	$44.5	$45.2	$40.4	$46.5	$34.0
	M.S.	—	25.5	30.0	35.0	39.1	48.0	44.2	48.3	47.0	45.0	38.0
	Ph.D.	—	—	36.4	41.5	46.5	52.5	55.0	56.0	60.0	58.0	48.0
Women	B.S.	20.6	23.0	25.0	27.6	35.5	32.6	(36.0)	40.0	(40.0)	—	25.5
	M.S.	—	(26.7)	27.8	30.0	37.2	(34.0)	(38.0)	(38.8)	—	—	30.2
	Ph.D.	—	—	35.7	38.0	42.0	(40.0)	—	(55.0)	—	—	38.6
Work function												
General management	B.S.	—	—	(28.4)	(36.0)	(40.0)	(46.0)	(58.0)	52.5	61.3	(61.5)	46.7
	M.S.	—	—	(29.8)	(33.6)	(48.0)	—	—	(69.5)	(54.0)	—	50.0
	Ph.D.	—	—	—	(45.0)	50.0	55.9	(67.0)	74.0	(60.0)	(78.0)	60.0
R&D management	B.S.	—	—	(31.1)	40.0	41.3	(44.0)	54.0	48.5	45.0	58.0	45.5
	M.S.	—	—	(35.0)	40.2	45.0	55.0	(50.0)	58.6	54.2	—	48.0
	Ph.D.	—	—	(38.7)	45.6	53.0	58.0	60.0	61.2	66.0	64.0	58.0
Basic research	B.S.	21.0	23.2	26.4	29.2	(35.5)	(36.5)	—	(42.0)	—	—	26.0
	M.S.	—	(25.5)	28.8	33.0	36.0	(42.2)	(42.9)	—	—	—	34.0
	Ph.D.	—	—	36.4	40.0	42.9	55.0	55.0	55.9	55.6	(60.0)	42.0
Applied research	B.S.	21.1	23.6	26.6	30.4	35.2	38.6	41.4	45.5	41.0	42.5	30.0
	M.S.	—	(26.0)	30.0	35.0	36.0	37.7	43.0	41.9	42.1	(46.4)	35.0
	Ph.D.	—	—	36.0	40.0	43.3	48.0	51.0	51.0	54.2	53.0	43.7
Marketing[b]	B.S.	—	24.0	33.0	33.4	(40.0)	40.0	45.0	47.0	41.0	(50.0)	40.0
	M.S.	—	—	31.3	(41.0)	(45.1)	(53.8)	—	47.5	(54.0)	—	42.7
	Ph.D.	—	—	(36.0)	—	(45.0)	(57.0)	(62.0)	(55.0)	—	(58.0)	50.8
Production[c]	B.S.	20.0	22.4	26.8	33.0	35.4	36.0	37.8	37.6	36.0	(29.5)	28.8
	M.S.	—	(26.7)	27.0	33.5	36.0	(45.0)	41.5	(35.5)	(47.5)	—	34.2
	Ph.D.	—	—	(37.5)	(40.0)	43.7	44.0	(49.0)	(43.1)	(45.0)	—	42.5
Work specialty[d]												
Analytical chemistry	B.S.	20.5	22.9	25.8	33.0	36.0	36.0	40.0	45.0	35.0	40.0	30.0
	M.S.	—	(25.0)	29.4	33.0	38.0	44.2	(43.0)	41.0	(46.8)	—	34.0
	Ph.D.	—	—	35.4	41.2	45.0	49.5	51.5	51.0	55.0	(50.0)	44.0
Agricultural chemistry	B.S.	—	(21.8)	(24.0)	(35.0)	(40.1)	—	(36.0)	(39.6)	(60.0)	—	35.0
	M.S.	—	—	—	35.3	—	—	—	(47.5)	—	—	38.0
	Ph.D.	—	—	(36.2)	39.0	50.6	50.0	(53.1)	(56.0)	(62.4)	(56.4)	48.0
Biochemistry	B.S.	—	(20.0)	(36.0)	—	—	—	—	—	—	—	22.0
	M.S.	—	—	—	—	(32.6)	—	—	—	—	—	33.5
	Ph.D.	—	—	(35.5)	41.7	44.2	(50.0)	(56.0)	(53.0)	(63.1)	—	44.2
Environmental chemistry	B.S.	—	(23.8)	26.5	33.8	(40.0)	—	—	(40.0)	(54.6)	—	32.2
	M.S.	—	—	28.2	32.6	(36.0)	(33.0)	(36.0)	—	—	—	33.5
	Ph.D.	—	—	—	(40.0)	(43.0)	61.0	(54.0)	(62.3)	—	(56.5)	51.0
Inorganic chemistry	B.S.	—	(25.2)	(26.0)	—	—	—	(45.0)	(43.9)	—	—	39.0
	M.S.	—	—	—	(37.0)	—	(45.5)	—	—	—	—	40.5
	Ph.D.	—	—	36.7	42.8	45.0	50.0	(50.6)	58.0	—	—	46.0
Organic chemistry	B.S.	(21.0)	25.0	27.5	28.0	38.0	38.6	52.0	45.0	(46.3)	59.6	36.0
	M.S.	—	—	27.1	33.4	40.0	50.0	(44.0)	47.5	50.0	—	40.5
	Ph.D.	—	—	36.0	40.0	46.5	52.0	55.0	52.5	54.0	56.5	48.0
Pharmaceutical chemistry	B.S.	(21.7)	22.5	25.6	30.0	40.0	(48.5)	—	(50.2)	(40.0)	—	22.9
	M.S.	—	(26.2)	26.8	33.2	38.9	—	—	(54.4)	—	—	35.2
	Ph.D.	—	—	36.0	40.5	45.0	57.5	56.1	59.0	(69.5)	65.5	47.0
Physical chemistry	B.S.	—	(23.5)	(35.0)	(32.1)	—	—	—	—	—	—	35.0
	M.S.	—	—	(30.0)	—	—	—	—	—	—	—	38.0
	Ph.D.	—	—	39.0	44.0	49.0	53.0	54.0	60.0	(69.2)	(80.0)	48.5
Polymer chemistry	B.S.	(24.5)	24.0	29.0	32.8	37.5	42.4	(45.2)	50.0	(44.9)	(56.0)	35.0
	M.S.	—	(28.0)	31.3	40.1	41.2	48.0	44.2	49.0	(45.8)	(40.0)	40.0
	Ph.D.	—	—	37.5	40.0	47.5	52.5	56.0	60.0	60.0	61.0	49.4
CHEMISTS EMPLOYED FULL TIME IN ACADEMIA (Ph.D.s ONLY)												
Ph.D.-granting schools												
Professor		—	—	—	—	39.2	40.0	44.0	49.0	50.0	53.5	47.5
Associate professor		—	—	—	31.0	34.8	34.6	34.0	(36.5)	(37.7)	(35.0)	33.7
Assistant professor		—	—	24.0	26.2	27.4	30.0	—	—	—	—	26.0
Non-Ph.D.-granting schools												
Professor		—	—	—	—	32.5	32.0	34.6	36.0	36.0	32.4	34.2
Associate professor		—	—	—	25.0	25.0	27.5	30.0	30.0	(30.0)	—	26.8
Assistant professor		—	—	19.8	21.0	22.1	(21.2)	(22.6)	—	—	—	21.0

a As of March 1, 1984. b Includes purchasing, technical service, and economic evaluation. c Includes quality control. d Refers to current work, not field in which degree was obtained. **Note:** Where no salary data are shown, sample is too small to provide a meaningful figure; data in parentheses are from relatively small samples as well and should be treated with caution. **Source:** ACS survey

Unemployment is lower than last year for chemists, but still higher than in earlier years

Employment status[a]	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
Employed full time	93.7%	93.5%	94.9%	95.6%	95.9%	95.0%	95.7%	95.4%	94.7%	95.0%	95.1%
Employed part time	1.7	1.7	1.4	1.1	1.0	2.0	1.0	1.1	1.3	1.3	1.0
Postdoctoral or fellowship	2.9	2.6	2.2	2.2	2.2	1.9	1.9	2.1	2.2	2.0	2.5
Unemployed	1.7	2.2	1.5	1.1	0.9	1.1	1.4	1.5	1.9	1.6	1.4

a As of March 1; excludes unemployed chemists not seeking employment. **Source:** ACS survey

for men; last year it was 84% and in 1982 it was 89%.

The gap between men's and women's salaries is narrowest during the early years of their career. The median for women in industry with a B.S. is 97% that for men if they have been working for only four years or less. But women industrial chemists who received a B.S. 20 to 24 years ago have a median salary only 82% as high as that earned by similar men.

As has long been the case, women also are more often unemployed than men. This year's ACS survey indicates that 2.6% of women chemists last March were without jobs but seeking them, compared with only 1.6% of men chemists. The 1984 unemployment rate for women, nonetheless, is lower than the rates of 3.3% in 1983 and 2.8% in 1982. Women also are more likely than men to be working part time, doing postdoctoral work, or out of the job market.

Unemployment likewise is nearly twice as high for chemists who do not have a Ph.D. degree than for those who do. For B.S. chemists, the unemployment rate has declined to 2.2% from 3.3% in 1983; for Ph.D.s it has fallen to 1.2% from 1.8% last year. The rate for chemists whose highest degree is an M.S., however, is essentially unchanged from 1983 at 2.2%.

The employment picture is likely to brighten further for chemists this year. Business continues to improve for the chemical industry and other business areas that employ large numbers of chemists. Production in the chemicals and allied products industry is nearly 20% higher now than it was at the recession low in late 1982. And profits for major U.S. chemical producers surged 70% from a year earlier during this year's first quarter.

Growing strength in the job market for chemists is clearly indicated by the rising volume of classified employment advertising running in C&EN, which carries more such advertising for chemists than any other U.S. publication. So far this year, the volume of help-wanted advertising is about two thirds higher than a year ago. Volume for 1984's second quarter alone was 77% higher than in the second quarter of 1983, climbing to the highest level for any second quarter since 1980.

The data on the current employment status and salaries of ACS members reported here are based on more than 10,000 responses to a survey conducted last March by the Office of Statistical Services of the ACS Department of Professional Services. The survey was limited to members who are not older than 70, have U.S. mailing addresses, and do not have student, retired, or emeritus status.

Later this month, the Office of Statistical Services will publish a report on its annual survey for 1984 with a more detailed compilation of data than presented above. This report, "Salaries 1984," can be purchased from the Distribution Office, American Chemical Society, 1155—16th St., N.W., Washington, D.C. 20036, for $75 a copy. □

Joblessness is least in government and academia

	% of chemists in category	% unemployed[a]
MOST RECENT EMPLOYER		
Industry	57%	1.8%
College/university	28	1.3
Government	9	0.3
Other	6	2.1
MOST RECENT WORK FUNCTION		
R&D[b]	35%	1.4%
Teaching	27	1.3
Management[c]	16	1.4
Marketing, production[d]	12	2.1
Other	10	1.9
MOST RECENT WORK SPECIALTY		
Analytical	21%	2.1%
Organic	17	1.5
Polymers	11	1.4
Pharmaceutical	9	1.5
Biochemistry	8	0.8
Physical	8	1.5
Inorganic	7	2.0
Environmental	6	2.0
Agricultural	4	1.3
Other	8	2.3

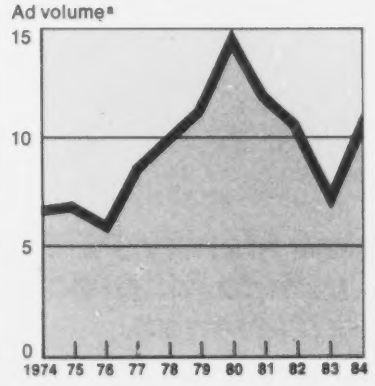
a As of March 1, 1984; excludes unemployed chemists not seeking employment. b Nonacademic only. c Includes R&D management. d Includes purchasing, technical service, economic evaluation, and quality control. **Source:** ACS survey

Unemployment highest among youngest chemists

Age	% of chemists in category	% unemployed[a]
20–24	2%	4.8%
25–29	12	2.1
30–34	17	1.6
35–39	15	1.3
40–44	14	1.1
45–49	11	1.9
50–54	10	0.9
55–59	9	2.6
60 and older	9	1.7

a As of March 1, 1984; excludes unemployed chemists not seeking employment. **Source:** ACS survey

Help-wanted ads rebound from three-year slump



a Volume of help-wanted advertising (in thousands of column inches) in C&EN for the 12 months ending with May of each year.